

# 50 mJ Monolithic 2 $\mu$ m Pulsed Fiber Laser Transmitter in 200 ns Regime with Transform-Limited Linewidth Based on Highly Tm-Doped Germanate Fibers, Phase I

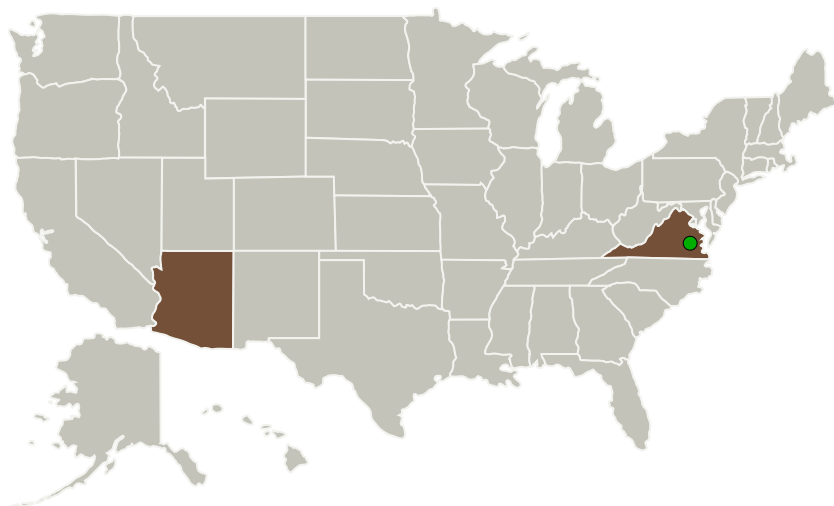
Completed Technology Project (2011 - 2011)



## Project Introduction

For NASA's various types of coherent LIDAR applications, NP Photonics propose to develop a 50 mJ monolithic 2 micron pulsed fiber laser transmitter in 200 ns regime with transform-limited linewidth, leveraging on NP's proprietary germanate active fibers. NP's patented large core SM PM highly Tm-doped germanate glass fibers have high unit gain and high stimulated Brillouin scattering (SBS)-threshold. We will use our proprietary single-frequency actively Q-switched fiber laser seed in order to make the whole high power narrow linewidth pulsed fiber laser transmitter compact and expandable to spaceborne or UAV platforms. In Phase I, one new SM PM highly Tm-doped germanate fiber with 25 micron core will be fabricated and used for the power amplifier stage in order to demonstrate 1-5 mJ pulse energy and  $\sim 10$  kW peak power for 200 ns fiber laser pulses with SBS-free. In Phase II, 100 micron core germanate fiber will be designed and fabricated in order to demonstrate 50 mJ fiber laser pulses with 100's kW SBS-threshold and transform-limited linewidth. In this project, NP Photonics will offer prototype/product service to NASA by delivering 1-50 mJ monolithic 2 micron pulsed fiber laser transmitter in 200 ns regime with transform-limited linewidth.

## Primary U.S. Work Locations and Key Partners



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## Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destinations	3

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Organizations Performing Work	Role	Type	Location
NP Photonics, Inc.	Lead Organization	Industry	Tucson, Arizona
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Arizona	Virginia

## Project Transitions

**February 2011:** Project Start

**August 2011:** Closed out

### Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137803>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

NP Photonics, Inc.

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

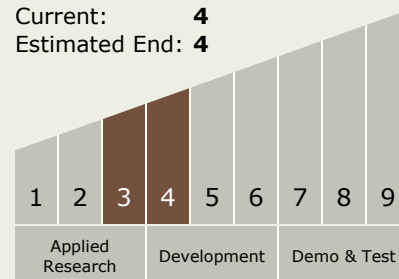
Carlos Torrez

### Principal Investigator:

Wei Shi

## Technology Maturity (TRL)

Start: **3**  
Current: **4**  
Estimated End: **4**



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## Technology Areas

### Primary:

- TX08 Sensors and Instruments
  - └ TX08.1 Remote Sensing Instruments/Sensors
  - └ TX08.1.5 Lasers

## Target Destinations

The Sun, Earth, The Moon,  
Mars, Others Inside the Solar  
System, Outside the Solar  
System